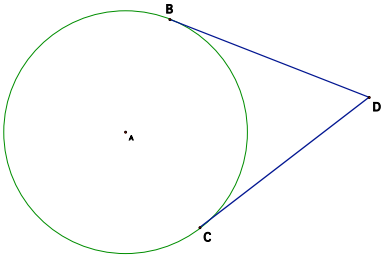
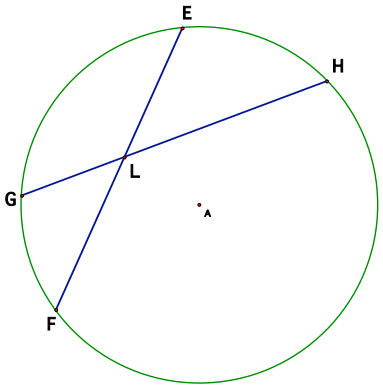
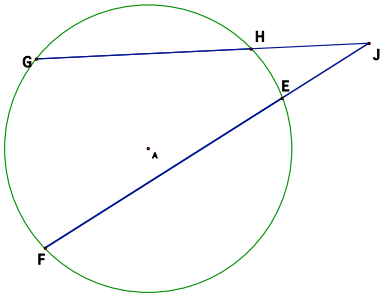
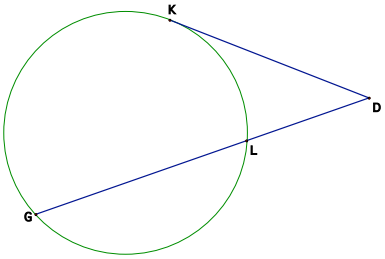
Geometry 10.5 Notes: Segment Length in Circles
(pp 629-635) **Date_____**

Intersection	Geometric Representation	Algebraic Representation
2 tangents		DB=DC
2 chords		$LE \bullet LF = LG \bullet LH$
2 secants		$GJ \bullet HJ = FJ \bullet EJ$
tangent-secant		$DG \bullet DL = (DK)^2$

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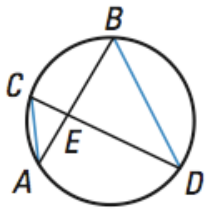
You can use similar triangles to prove Theorem 10.15.



GIVEN ▶ $\overline{AB}$, $\overline{CD}$ are chords that intersect at E.

PROVE ▶ $EA \cdot EB = EC \cdot ED$

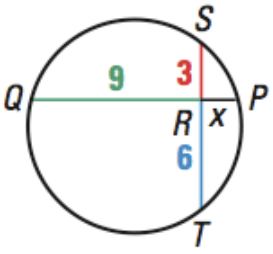
Paragraph Proof Draw $\overline{DB}$ and $\overline{AC}$. Because $\angle C$ and $\angle B$ intercept the same arc, $\angle C \cong \angle B$. Likewise, $\angle A \cong \angle D$. By the AA Similarity Postulate, $\triangle AEC \sim \triangle DEB$. So, the lengths of corresponding sides are proportional.

$$\frac{EA}{ED} = \frac{EC}{EB}$$ **The lengths of the sides are proportional.**

$$EA \cdot EB = EC \cdot ED$$ **Cross Product Property**

EXAMPLE 1 *Finding Segment Lengths*

Chords $\overline{ST}$ and $\overline{PQ}$ intersect inside the circle. Find the value of x.



SOLUTION

$RQ \cdot RP = RS \cdot RT$ **Use Theorem 10.15.**

$9 \cdot x = 3 \cdot 6$ **Substitute.**

$9x = 18$ **Simplify.**

$x = 2$ **Divide each side by 9.**

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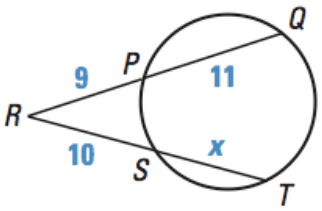
EXAMPLE 2 *Finding Segment Lengths*

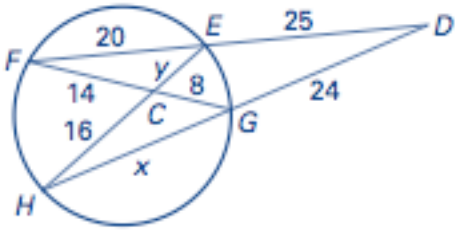
Find the value of x.

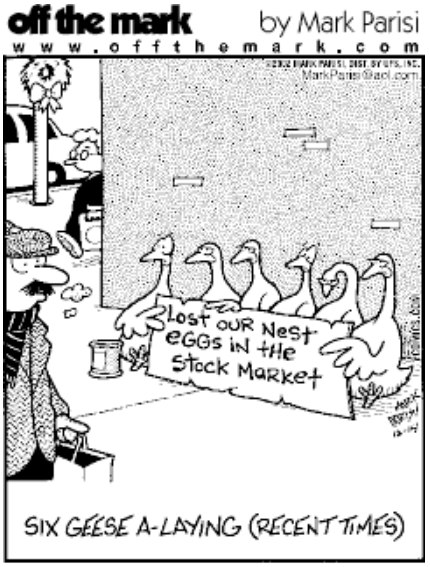


SOLUTION

$RP \cdot RQ = RS \cdot RT$	**Use Theorem 10.16.**
$9 \cdot (11 + 9) = 10 \cdot (x + 10)$	**Substitute.**
$180 = 10x + 100$	**Simplify.**
$80 = 10x$	**Subtract 100 from each side.**
$8 = x$	**Divide each side by 10.**

3. Guided Practice: Find the values of x and y.





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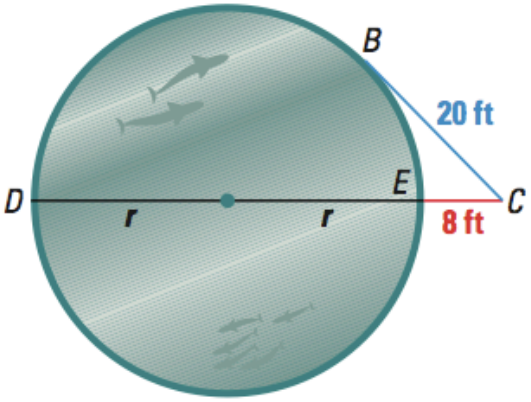
EXAMPLE 3 *Estimating the Radius of a Circle*

AQUARIUM TANK You are standing at point C, about 8 feet from a circular aquarium tank. The distance from you to a point of tangency on the tank is about 20 feet. Estimate the radius of the tank.



SOLUTION

You can use Theorem 10.17 to find the radius.

$(CB)^2 = CE \cdot CD$ **Use Theorem 10.17.**

$20^2 \approx 8 \cdot (2r + 8)$ **Substitute.**

$400 \approx 16r + 64$ **Simplify.**

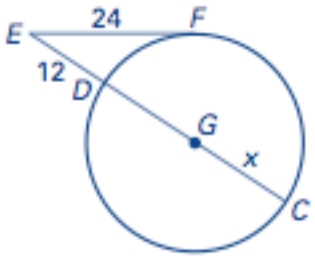
$336 \approx 16r$ **Subtract 64 from each side.**

$21 \approx r$ **Divide each side by 16.**

▶ So, the radius of the tank is about 21 feet.

Guided Practice.

4. Find the value of x.



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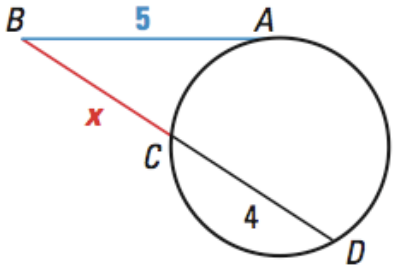
EXAMPLE 4 Finding Segment Lengths

Use the figure at the right to find the value of x.



SOLUTION

$(BA)^2 = BC \cdot BD$ — **Use Theorem 10.17.**

$5^2 = x \cdot (x + 4)$ — **Substitute.**

$25 = x^2 + 4x$ — **Simplify.**

$0 = x^2 + 4x - 25$ — **Write in standard form.**

$x = \dfrac{-4 \pm \sqrt{4^2 - 4(1)(-25)}}{2}$ — **Use Quadratic Formula.**

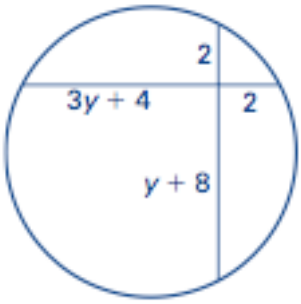
$x = -2 \pm \sqrt{29}$ — **Simplify.**

Use the positive solution, because lengths cannot be negative.

▶ So, $x = -2 + \sqrt{29} \approx 3.39$.

7. _____ Find the value of y.

A) 1
B) 2
C) 3
D) 4
E) 5



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8. Describe how to findi the length of the segments of a circle formed by two secants intersecting at an external pont.